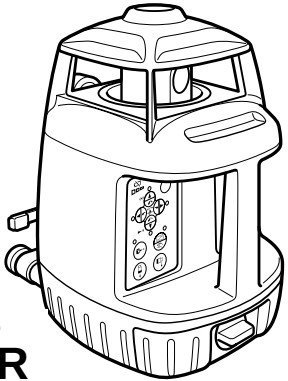
TOPCON



INSTRUCTION MANUAL

ROTATING LASER

RL-VH3G/A/B

Declaration of Conformity

Model Number:	RL-VH3G/A/B
Trade Name:	TOPCON CORPORATION
Responsible party:	TOPCON LASER SYSTEM, INC.
Address:	5758 West Las Positas Blvd., Pleasanton, CA 94588, U.S.A.
Telephone number:	925-460-1300

This device complies with Part 15 of the FCC Rules, Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Foreword

Thank you for purchasing the Topcon RL-VH3G/A/B Rotating Laser.
It is one the world's most advanced lasers.
To quickly and effectively use the RL-VH3G/A/B, please read these brief instructions carefully, and keep them in a convenient location for future reference.

Handling Precautions

1 Vibration and Impact Protection

When transporting the instrument, provide protection to minimize risk of severe vibration or impact. Severe vibration or impacts may affect beam accuracy.

2. Laser Scanning Interference

Particular reflective surfaces such as mirrors and some glass surfaces, can cause beam reflection that in very rare circumstances can interfere with the laser scanning function. If this should happen, simply change the location of the laser or cover the reflective surface.

Caution:

Use of adjustment controls or performance procedures other than those specified herein may results in hazardous radiation exposure.

Safety Information

In order to ensure the safe use of this product, prevent any danger to the operator or others, or damage to property, important warnings are placed on the product and inserted in the instruction manual.
We recommend that you become familiar with the meaning of these Warnings and Cautions before continuing.

Display	Meaning
⚠ **WARNING**	Ignoring or disregard of this display may lead to death or serious injury.
⚠ **CAUTION**	Ignoring or disregard of this display may lead to personal injury or physical damage to the instrument.

Injury refers to hurt, burn, electric shock, etc.
Physical damage refers to damage to equipment and structure or furnishings.

Safety Precautions

⚠ WARNING
• **There is a risk of fire, electric shock or physical harm if you attempt to disassemble or repair the instrument yourself.** Repairs are to be carried out by TOPCON or an authorized dealer ONLY!
• **Laser beams can be dangerous and can cause eye injury if used incorrectly.** Never attempt to repair the instrument yourself.
• **Laser beams can be dangerous. They can cause eye injury.** Do not stare into beam.
• **Risk of fire or electric shock.** Do not use a wet battery.
• **May ignite explosively.** Never use an instrument near flammable gas, liquid matter, and do not use in a coal mine.
• **Battery can cause explosion or injury.** Do not dispose in fire or heat.
• **Short circuits can cause a fire.** Do not allow a battery to contact other objects when storing it.

⚠ CAUTION
Use of controls, adjustment to the laser, or the performing of any procedures other than those specified herein may result in hazardous radiation exposure.
DO NOT allow anyone to work directly in the path of the laser beam. Always make sure the laser is operating above the height of your crews heads. Exposure to laser light may cause momentary blindness. Always use caution when operating equipment near a laser.
Do not allow skin or clothing to come into contact with acid from the batteries. If this occurs, wash off with copious amounts of water and seek medical attention.
Damaged or broken carrying cases may fall open causing injury, or damage to the laser. Do not use a carrying case with damaged belts, grips or latches.
It could be dangerous if the instrument falls off of its mount. Please check that you have mounted the instrument to the wallmount or tripod securely and correctly.
An unstable tripod can pose a potential risk of injury, or damage to the laser. Always check that screws or leg locks are tight, and tripod is sitting firmly. Please note that the tips of tripod can be hazardous, be aware of this when setting up or carrying the tripod.
Please note that the tips of tripod can be hazardous, be aware of this when setting up or carrying the tripod.

User Precautions

Always wear the protective clothing (safety shoes, helmet, etc.) when operating.

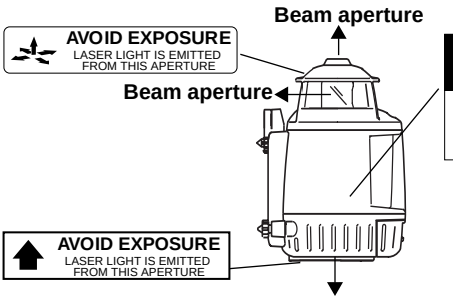
Exceptions from Responsibility

1) The user of this product is expected to follow all operating instructions and make periodic checks of the product's performance.
2) The manufacturer, or its representatives, assumes no responsibility for results of a faulty or intentional usage or misuse including any direct, indirect, consequential damage, and loss of profits.
3) The manufacturer, or its representatives, assumes no responsibility for consequential damage, and loss of profits by any disaster, (an earthquake, storms, floods etc.).
   A fire, accident, or an act of a third party and/or a usage any other usual conditions.
4) The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits due to a change of data, loss of data, an interruption of business etc., caused by using the product or an unusable product.
5) The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits caused by usage except for explained in the user manual.
6) The manufacturer, or its representatives, assumes no responsibility for damage caused by wrong movement, or action due to connecting with other products.

Laser Safety

This product uses a visible laser beam, and is manufactured and sold in accordance with “Performance Standards for Light-Emitting Products” (FDA/BRH 21 CFR 1040) or “Radiation Safety of Laser Products, Equipment Classification, Requirements and User’s Guide” (IEC Publication 825) provided on the safety standards for laser beam.
As per the said standard, this product is classified as a “Class 3A (IIIA) Laser Product”.
This is a simple product to operate and does not require training from a laser safety officer.
In case of any failure, do not disassemble the instrument. Contact TOPCON or your TOPCON dealer.

Labels



For RL-VH3A/B

For RL-VH3G

Contents

Foreword 1
Handling Precautions 1
Safety Information 2
Safety Precautions 3
User Precautions..... 5
Exceptions from Responsibility 5
Laser Safety 6
Labels..... 6
Contents 7
Standard System Components 8
Main Features 9
Nomenclature and Functions 12
Preparation For Use 18
Battery Installation 18
Instrument Set-up Procedure 18
Using Plumb beam (RL-VH3B has vertical plumb beam only) 19
Battery Warning Indicator 20
Auto-leveling lamp..... 20
Operation 22
Scanning Mode 22
Continuous scan..... 23
Auto Focus (RL-VH3A/G Only) 24
Changing rotation speed 25
Laser Pointing Mode (stop) 25
Laser Sensor Mode (RL-VH3A/B Only) 26
Plumb Finder Mode 26
Height Alert function 27
High Power Mode (RL-VH3G Only) 27
Setting Slopes 28
Vertical Beam Alignment 34
Setting 90° Vertical Layouts 42
Operational Example 44
Maintaining Power Sources 45
Checking and Adjusting 48
Horizontal Calibration 49
Horizontal Rotation Cone Error 52
Vertical Calibration (Upward) 53
Laser Beam (Downward) 58
Storage Precautions 59
Standard / Optional Accessories 60
Specifications 67
Error Indication..... 71

Standard System Components

1 RL-VH3G/A/B (RL-VH3A/G includes Floor Mount model 6) ..... 1pc.
2 Magnetic Target ..... 2pc.
3 Alignment Target ..... 1pc.
4 Wall Mount Model-2C (RL-VH3G/A) or Model-1C (RL-VH3B) ..... 1pc.
5 *Battery unit 1set
6 Carrying case ..... 1pc.
7 Calibration decals 1set
8 Instruction manual ..... 1vol.

Please make sure that all of the above items are in the box when you unpack.
Additional Magnetic Scanning Targets may be included in some markets.

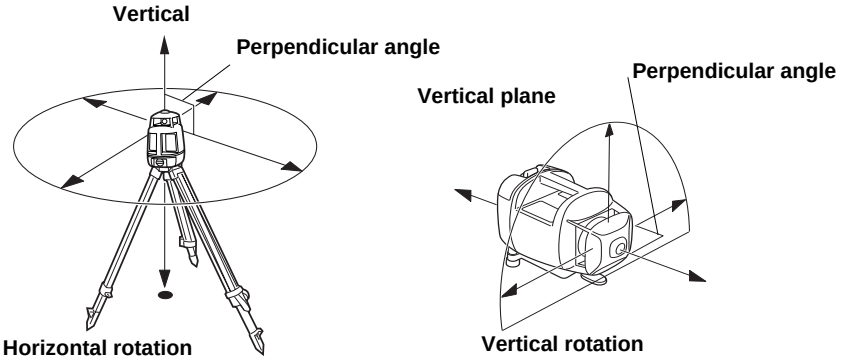
* The following are battery configurations. Included battery configurations very by package.

Rechargeable battery type: (with Built-in Run/Charge system) Rechargeable battery (BT-49Q) ..... 1pc. Holder (DB-49C) ..... 1pc. AC/DC converter model, AD-9B/7C 1pc.	Dry battery type: Holder (DB-49) ..... 1pc. D- cell ..... 4pcs.

Main Features

Visible Laser Beam

Visible beam lasers enable you to put the lasers beam to work directly on your work area without the need for a level sensor.
The RL-VH3G is especially easy to see with its green laser beam.
Laser beams are emitted at exact 90° angles as shown below.



The RL-VH3G and RL-VH3A models also emit a laser beam from the bottom which eliminates the need for plumb bobs when centering over a point.

Automatic Beam Focus (RL-VH3A/G Only)

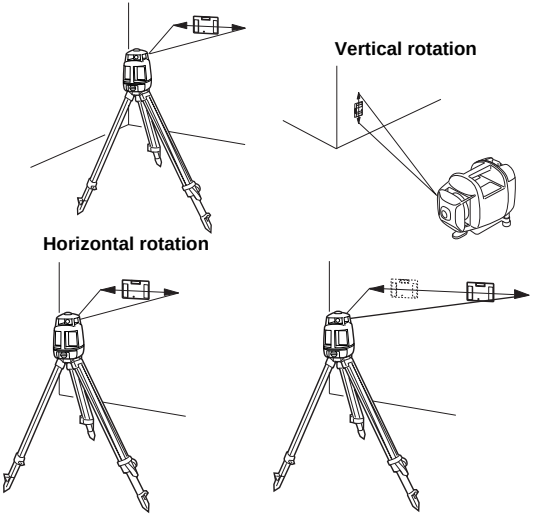
When the target is used, the laser will focus automatically to the target.
(It is also possible to focus manually with operating keys.)

Scanning

When the target is used, the laser beam automatically searches for and tracks it.

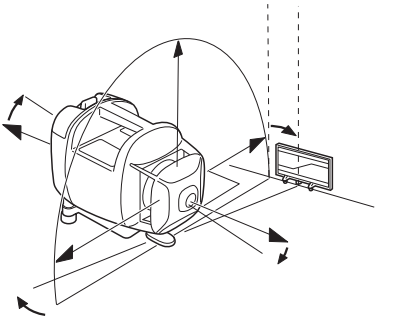
Continuous Scan

Scanning beam can be "drawn" to any length (up to 180°) and maintained without the aid of the target for hands free operation.



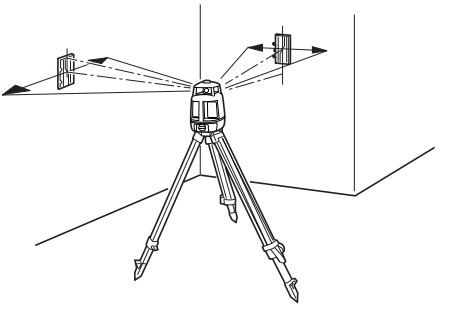
Automatic Line Control

Set the alignment target centered on far control point when in auto alignment mode, the laser beam is aligned automatically.
(can also be done manually.)



Automatic Grade Setting

Using alignment target, grade setting will be done automatically.
(can also be done manually.)

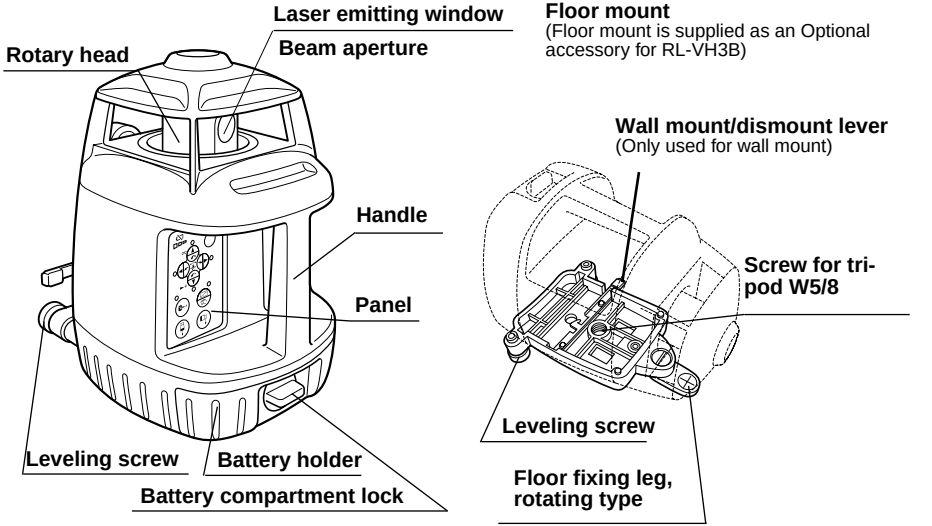


Plumb Finder Mode

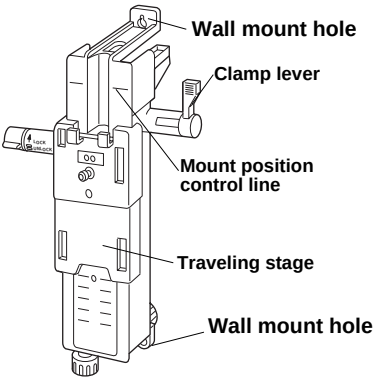
Provides a plumb laser spot below the rotating head to aid laser set-up over an initial control point.

Nomenclature and Functions

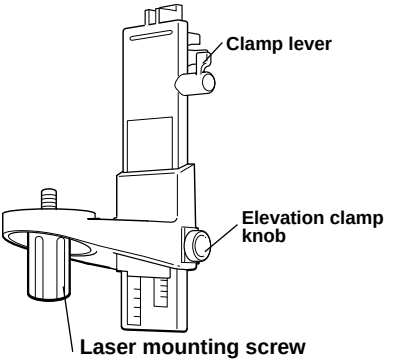
RL-VH3G/A/B



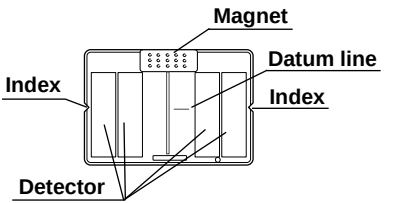
Wall mount model-2C



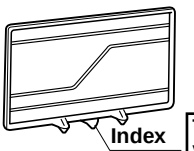
Wall mount model-1C



Magnetic Scanning Target



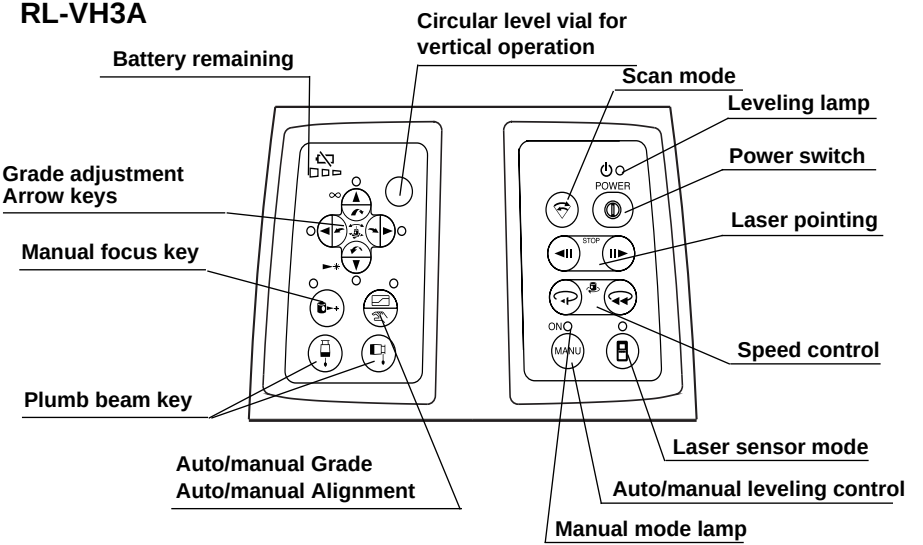
Alignment target



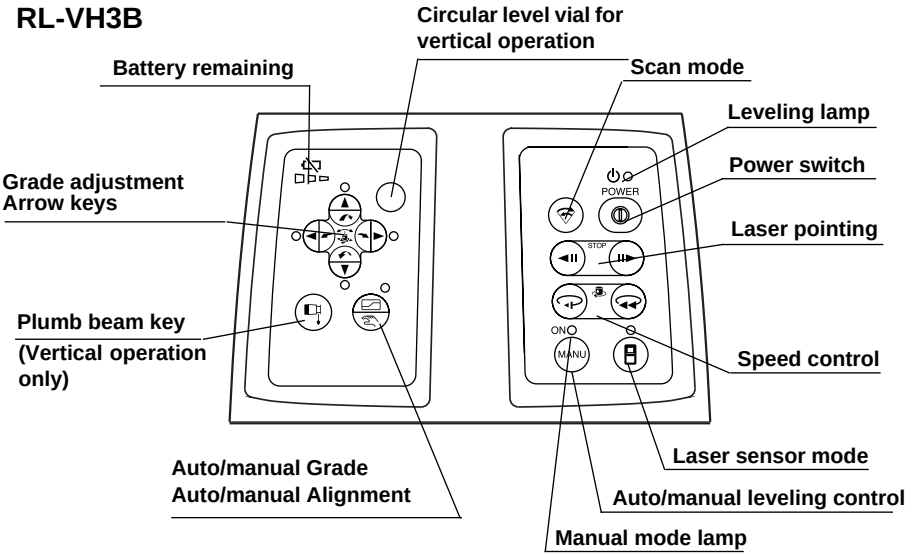
The blue target is for RL-VH3G and the red target is for RL-VH3A/B.

Panel

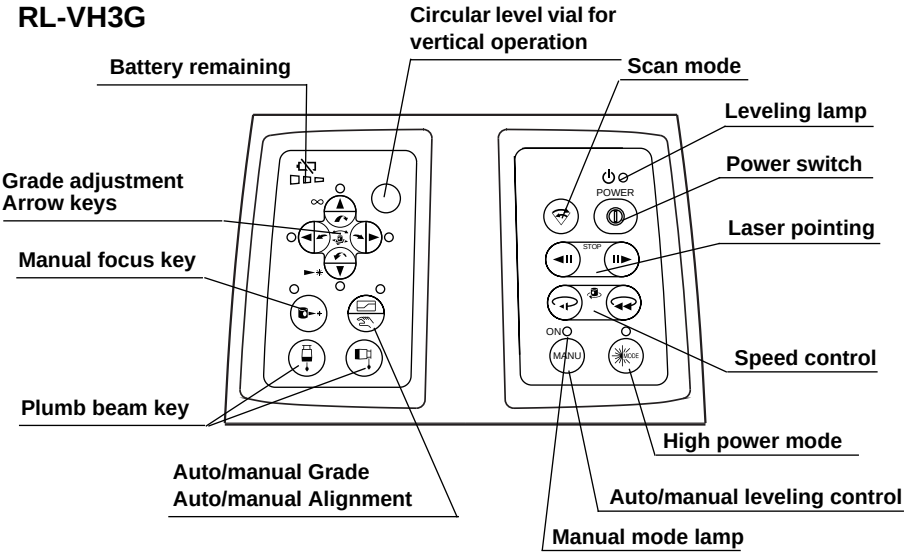
RL-VH3A



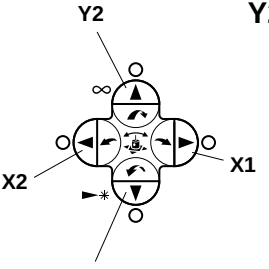
RL-VH3B


Circular level vial for vertical operation
Battery remaining
Scan mode
Leveling lamp
Power switch
Grade adjustment Arrow keys
POWER
STOP
Laser pointing
Plumb beam key
(Vertical operation only)
ON
MANU
Speed control
Laser sensor mode
Auto/manual Grade
Auto/manual Alignment
Auto/manual leveling control
Manual mode lamp

RL-VH3G


Circular level vial for vertical operation
Battery remaining
Scan mode
Leveling lamp
Power switch
Laser pointing
Grade adjustment Arrow keys
Manual focus key
Speed control
Plumb beam key
High power mode
Auto/manual Grade
Auto/manual Alignment
Auto/manual leveling control
Manual mode lamp
POWER
STOP
ON
MANU
MODE

Arrow keys



Arrow keys

Y2, Y1 key functions

- Use to select either Y1 or Y2 direction in auto slope. (Horizontal rotation only)
- Focussing the laser in manual focussing mode.
- Selecting a direction the beam should move to scan the floor target in auto line control mode. (Vertical rotation only)
- Setting Y axis grade in manual slope mode. (Horizontal rotation only)

X2, X1 key functions

- Selecting either X1 or X2 direction in auto slope.
- Selecting a control direction in auto line control mode. (Vertical rotation only)
- Moving the laser in manual line control mode. (Vertical rotation only)
- Selecting X axis direction in manual slope. (Horizontal rotation only)

Preparation For Use

Battery Installation

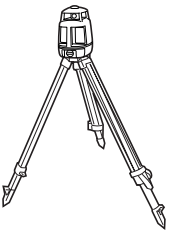
For battery placement or replacement instructions, see Maintaining Power Sources section, page 45 .

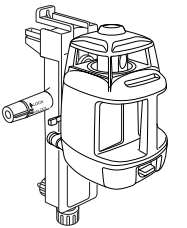
Instrument Set-up Procedure

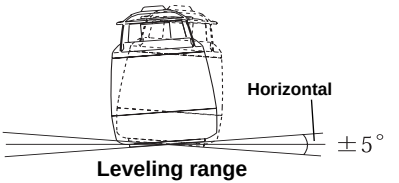
Horizontal Rotation

1 Set the instrument on any smooth surface that is within ±5° of true level. The RL-VH3G/A/B auto-level system will not function if the unit is placed more that 5° out of level. For best operation, it is recommended that it be mounted to a tripod or the Topcon Wall Mount Model 2C (provided).

Slope can be set in both axes, X and Y. See "Setting Slope" section, page 28 .



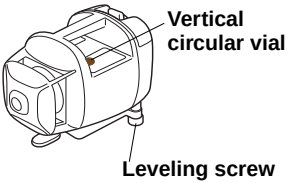




Vertical Rotation

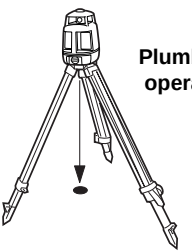
1 Place the instrument on its back as shown in the illustration.

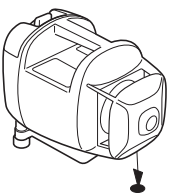
2 Turn the leveling screw on the instrument until the bubble is centered in the circular level vial.



Using Plumb beam (RL-VH3B has vertical plumb beam only)

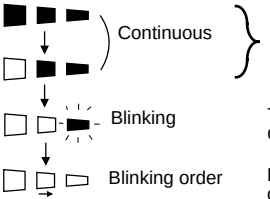
You can set the instrument using with the plum laser for centering.
Press the plumb beam key to emit the plumb beam.





Battery Warning Indicator

The Battery warning indicator will be shown for several minutes when the instrument is powered ON or when the battery level changes.



Battery is sufficient.

The power is low, but laser is still usable. (Blinking continues until batteries are dead.)

Dead batteries. Recharge the battery or replace the dry batteries with new ones.(The laser will turn completely off after blinking for about five minutes.)
NOTE:Even if an AC/DC converter is connected at this time, blinking still continues. Once the power is turned off, the battery remaining display will reset.

Note	• When BT-49Q is used, the blinking period will be short because of the characteristic of the battery. • Laser sensor LS-70A/B can detect low power state of laser.

Auto-leveling lamp

Flashing : Auto-leveling is in process. When automatic is leveling almost complete, the flashing rate will be slow. The head will not rotate and the laser beam will not emit during the auto-leveling process.

ON Solid: Auto-leveling is complete.
The rotary head is active and emits the laser beam.

To turn automatic leveling off

To turn OFF the auto-leveling function (manual mode), press the Auto-Manual leveling control pad twice in quick succession. The manual mode indicator light will illuminate. The instrument can be positioned in any direction and the laser beam remains on and the head will rotate.
IMPORTANT: In manual mode, the laser beam will not shut off if disturbed! To return to Auto-leveling mode, press Auto/Manual control pad once.

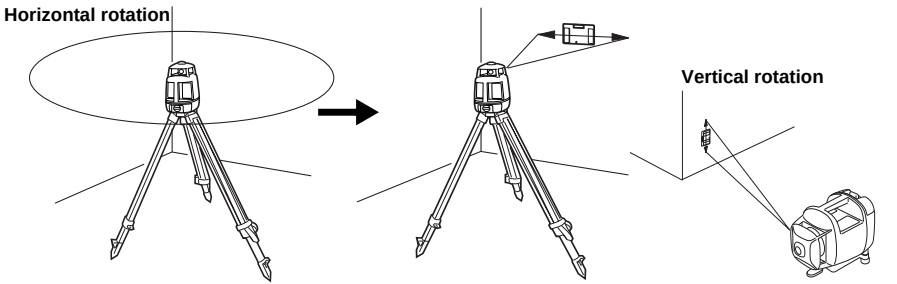
Operation

Scanning Mode

In scan mode, the laser rotates slowly, "searching" for the Magnetic Scanning Target. When the target is properly placed in the beam path, the laser beam will scan rapidly back and forth on the target and "track" the target as it is moved in its path.

1 Scanning mode is the default operating mode for the RL-VH3G/A/B. Each time the instrument is turned on, it is in scanning mode. To change when operating, press the Scan Mode Pad.

2 To initiate target scanning, place the Magnetic Scanning Target in the beam path with the reflective strips facing toward the laser.

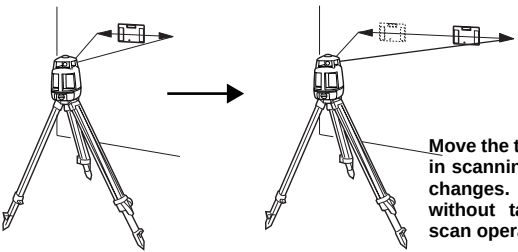


3 To stop scanning, remove target from beam path.

Note	• The target must be in the upright position for horizontal scanning use (magnet on top).

Continuous scan (Scan width can be "Drawn" and held for "Hands free" operation)

Place target in beam path and hold for a moment. The scanning beam will hesitate, then start again. When the target is removed the beam will hold that scan automatically.
To change the scanning width, move the target left or right after the scan hesitates and the scanning width will increase.



Scanning hesitates and starts again.

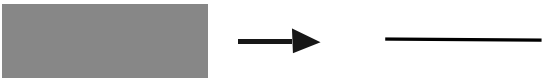
Move the target left or right within scanning, the scanning width changes. The scan continues without target for hands free scan operation.

To cancel the "Drawn" scan simply:

Place the target for more than one second into the scanning laser beam again.

Auto Focus (RL-VH3A/G Only)

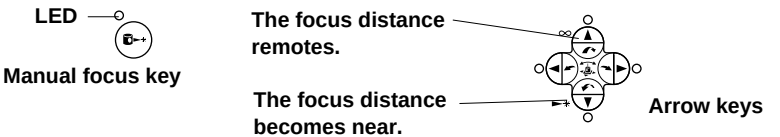
When a target is used, the beam will focus automatically at the target.



Manual Focusing (only for RL-VH3A/G)

It is also possible to focus manually with operating keys.

1 Press the manual focus key. The mode changes to manual focussing mode.



2 Focus can be adjusted manually by pressing upper or lower arrow key.

Note: When the laser beam is not focused, it may not be possible to detect a target.

To cancel the manual focusing mode;

Press the manual focus key again.

Note: When pressing the Auto/manual grade or Auto/manual alignment key, manual focus will be cancelled.

Changing rotation speed

Press either Speed Control pad to change rotation speed. The right pad increases the rotation speed. The left pad reduces the rotation speed.

Press the rotation speed keys to increase or decrease rotation speed.

Laser Pointing Mode (stop)

This mode stops rotation and allows the laser beam to be pointed by manually rotating the head. Press the mode control pad to select laser pointing mode. Beam rotation stops in this mode.

Stop Mode;

Press either laser pointing key. Stop mode is enabled, and the beam stops rotating.

To move the Laser Beam in Stop mode;

Press either laser pointing key. The beam moves in the direction of the key being pressed.

Pushing the key momentarily moves the beam slightly. Continuously holding the key down moves the beam rapidly in the direction of the arrow being pressed.

Laser pointing

Press the laser pointing keys to move the beam left or right.

Laser Sensor Mode (RL-VH3A/B Only)

For long range or outdoor applications, the instrument can be used with an optional electronic laser sensor. The Topcon models LS-70B or LS-70A are recommended. Press the Laser Sensor Mode Pad. The beam rotates at 600 rpm in this setting.

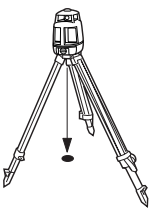
Laser sensor mode pad

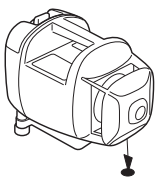
Plumb Finder Mode

(RL-VH3B has plumb beam for vertical operation only)
Provides a plumb laser spot below the rotating head to aid laser set-up over the initial control point.

Plumb beam pad for horizontal rotation (RL-VH3G/A Only)

Plumb beam pad for vertical rotation





Height Alert function

When auto-leveling is active, this function prevents the instrument from operating if it is disturbed. This insures accurate control. If the unit is disturbed, the elevation should be verified and reestablished if necessary.

1 To activate the height alert function, depress and hold the left of arrow keys (X2) (see page 17) on the control panel while turning on the instrument by pressing the Power control pad.

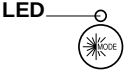
2 When this function is active and the unit is disturbed, visible LEDs will rapidly flash.

3 To re-activate auto-leveling and check the beam height, turn the unit off, then on again by pressing the Power control pad twice. After auto-leveling is complete, check the beam height to confirm it has not changed.

4 The Height Alert function is now inactive. To re-activate, turn unit off and repeat step 1.

High Power Mode (RL-VH3G Only)

Pressing the high power mode key, the laser power will change alternately.

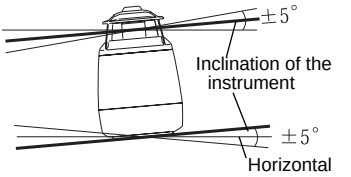


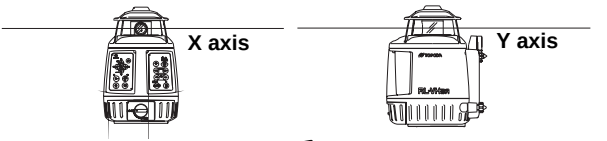
Note: When the instrument is in Scanning, Auto grade or Auto-line control mode, it is not possible to use High power mode.

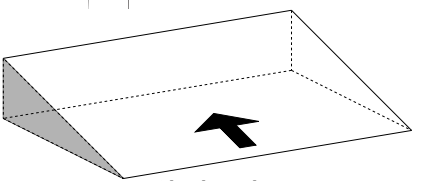
Setting Slopes

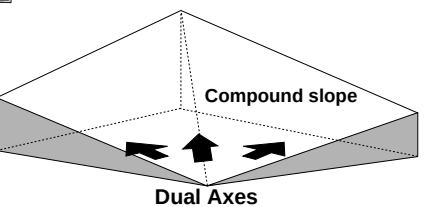
The laser beam can be sloped in either the X or Y axis (single slope) or both axes (compound slope).

Using the Slope Control pads (see page 12), the beam can be electronically raised or lowered 5 degrees above or below the inclination of the instrument. This means that slopes up to 5 degrees can be obtained if the instrument is set up on a level surface. For slopes greater than 5 degrees, the instrument must be manually positioned to within 5 degrees of the slope desired.

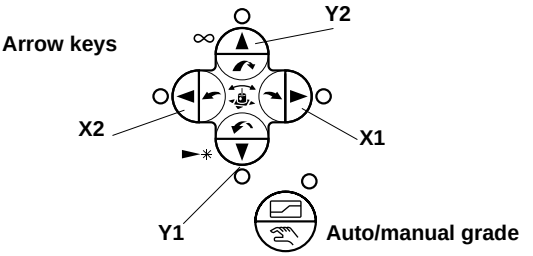


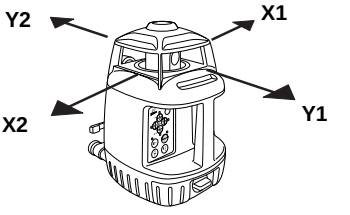






Setting automatic grade using the alignment target





Grade setting direction

How to set slope

Single axis setting

1 Turn the instrument on by pressing the power control pad. Auto-leveling will start.

2 Press the Auto/manual grading pad after auto-leveling is complete. The green Auto/manual Grade LED will light and the 4 red of arrow key LEDs will flash.

3 Press one of the arrow keys to set a slope in one of the directions shown above.
The arrow LED of the direction selected will stop flashing and the laser will start scanning in that direction.
*To change to another direction, press another arrow button after several seconds.

For Dual axes setting

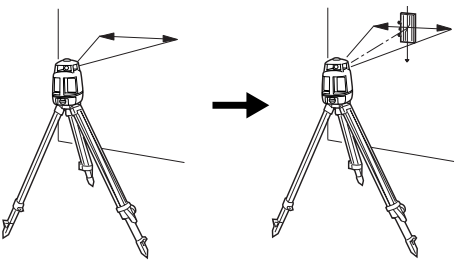
Press another arrow key for the second direction in less than 4 seconds after pressing the key for the first direction. (before the laser starts scanning in the first direction, The key LED for the second direction selected will stop flashing). The laser beam will pre-scan in each direction to show the directions set.

Note: If an arrow key for a second direction is pressed more than 4 seconds after the first, it won't be possible to set up a dual axis slope. The laser will return to single slope.

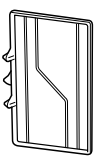
4 Place the alignment target into the scanning beam.

Note:

1) The alignment target must be in the correct orientation. Top and bottom is marked on the back of the target.
2) For improved slope accuracy, place the alignment target in the center of the scanning width.



Place the alignment target in the scanning beam.



The direction of alignment target

5 Place the target in the scanning beam so the beam travels in the direction of desired slope.

The scanning beam will "look" for the center of the target.

When the beam comes to the center of the target, the scanning width will narrow, and the beam will automatically focus.

For Dual axes setting

When dual axes are selected, the second direction repeats procedures 4 and 5.

6 When the alignment target is removed, the laser will be in scanning mode.

To cancel slope settings

Press the Manual Mode pad. The instrument returns to auto-leveling mode.

Operating range error

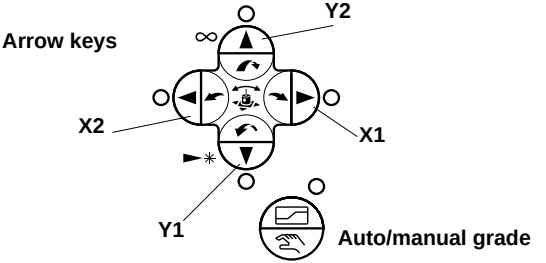
The range of the grade setting is within ±5 degrees.

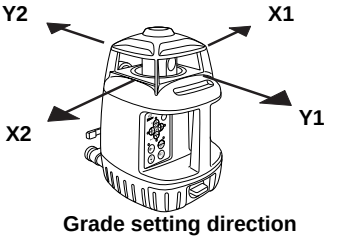
When the range has been exceeded, the red LEDs will flash alternately and the rotary head will return to a horizontal position.

Re-level, and set-up the instrument again.

Setting Manual Grade

It is also possible to set up slope manually. This can be used to increase or decrease grade already set in the laser.



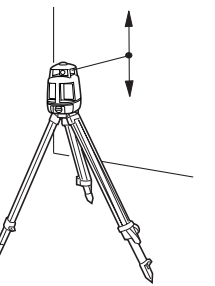


1 Turn the instrument on by pressing the power control pad. Auto-leveling will start.

2 Press the Auto/manual grading pad **twice** after auto-leveling is complete. The orange Auto/manual grade LED will light and the 4 red arrow key LEDs will flash.

3 Press an arrow key corresponding to the direction of desired slope as shown above. The LED of the direction selected will stop flashing.

Note: It is possible to change the laser mode.



The manual mode lamp will light.

4 If you want to set a compound slope, repeat steps 2 and 3 for next axis. The LED of the second direction selected will turn on.

To cancel slope settings

Press the Manual Mode pad. The instrument returns to auto-leveling mode.

Operating range error

The range of the grade setting is within ±5 degrees.

When the range has been exceeded, the red LEDs will flash alternately and the rotary head will return to a horizontal position.

Re-level, and set-up the instrument again.

Vertical Beam Alignment

Vertical Set-Up: Plumb finder mode

Provides a plumb laser spot below the rotating head to aid in laser set-up over an initial control point. This mode is used only for vertical set-up.

1 Rotate forward foot out 180°, and center it on the control point.

2 Use the leveling screws on the rear floor mounts to bring the bubble to the center of the vertical level vial.

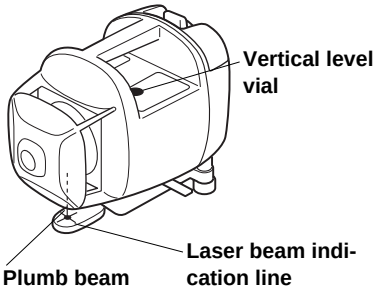
3 Press the Power Control key to turn unit on. When auto-leveling is complete, laser beam will rotate.

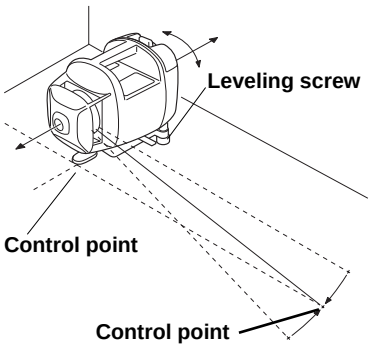
4 Make sure the rotating head is straight using the Manual Alignment mode.

5 Press Plumb beam key.

Confirm that the beam emits straight down centering on the laser beam indication lines of the front floor mount.

6 Set the instrument to the Auto/manual line control mode.(See page 35 ,40)





Auto Line Control: Smart Line mode

This mode provides one person alignment to a far control point.

There are two operating methods shown as follows;

1: Operation by keys at the laser

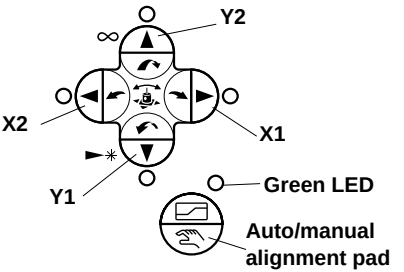
2: Operation at the alignment target side

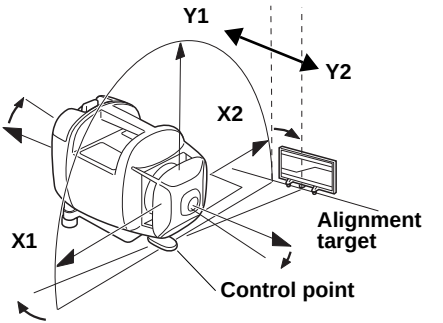
Operation by keys at the laser

1 Center the alignment target on the far control point.

2 Press the Auto/manual alignment pad. The green Auto/manual alignment key LED will light.

3 Press either the X1 or X2 key to set scanning for the side of the laser that has the target. The laser starts scanning and the selected key"s LED will flash.

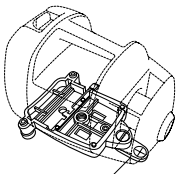




4 Press either the Y1 or Y2 key to move the scanning beam toward the center of the target. The beam will begin to move, and will align to the center of the target automatically. When the beam reaches the center of the target, the scanning width will narrow, and will automatically focus. The beam can now be moved manually for precise alignment on the control point. Refer to page 39 “Fine movement of the beam after completing alignment”.

5 When the alignment target is removed, the laser will be in Scan mode. Press the mode key to return to a rotating beam.

Note: In procedure 3, if you can not distinguish the position of the beam;
Rotate the unit, keeping the forward leg on the control point, and look for a reflection from the target.
Once you've placed the beam on the target, if it is allowed to remain there, alignment will start without pressing the Y1 or Y2.



Forward leg

Operating range error

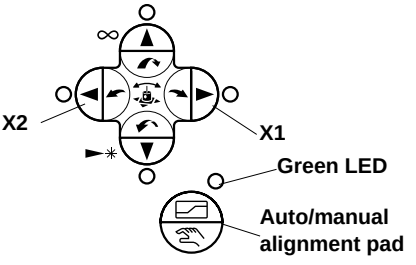
The range of line control is ±5 degrees.
When the range has been exceeded, the red LEDs will flash alternately and the rotary head will return to within 3 degrees of 0°.
Reset the instrument.

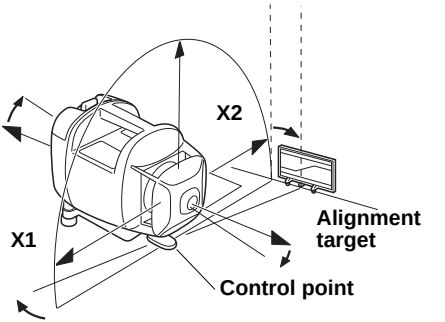
Operation at the alignment target side

1 Press the Auto/manual alignment key. The green Auto/manual alignment key LED will light.

2 Press either the X1 or X2 key to set scanning for the side of the laser that has the target. The laser starts scanning and the selected key's LED will flash.

3 Center the alignment target on the far control point, passing it slowly through the beam.





The beam will begin to move, and will align to the center of the target automatically. When the beam reaches the center of the target, the scanning width will narrow, and will automatically focus.

* The beam can now be moved manually for precise alignment on the control point.
  Refer to page 39 “Fine movement of the beam after completing alignment”.

Operating range error

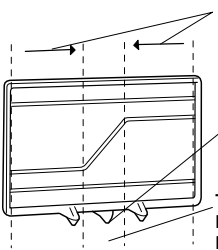
The range of line control is ±5 degrees.
When the range has been exceeded, the red LEDs will flash alternately and the rotary head will return to within 3 degrees of 0°.
Reset the instrument.

Fine movement of the beam after completing alignment

Fine movement of the beam will be possible after completing the alignment.

1 Move the beam slightly to the right or left by moving the target to the right or left.

The beam will move as follows:


The scanning laser moves toward the center direction of the target in this part.
Index
The scanning laser will stop moving in this part.
Put the target index on the control point.
If the beam requires more movement, repeat procedures 1 and 2.

2 To stop the laser from moving, move the target so it centers on the beam.

3 Put the target index on the control point. If the beam requires further movement, repeat steps 1 and 2.

4 When the alignment target is removed, the laser will be in Scan mode. Press the mode key to return to a rotating beam.

Manual Line Control (manual vertical beam alignment)

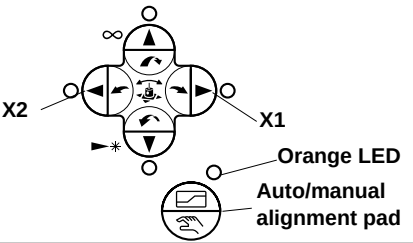
It is also possible to align the laser manually (without the alignment target).

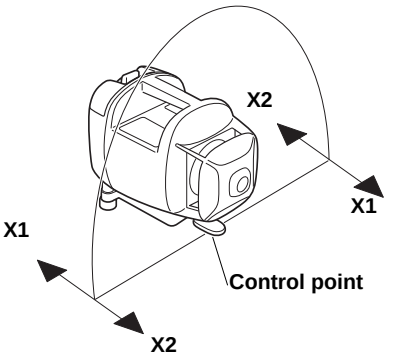
Manual alignment is possible from the following modes; Change rotation speed, Laser pointing, Level sensor, Scanning and Plumb finder.

1 Set the alignment target centered on the far control point.

2 Press the Auto/manual alignment key **twice**. The orange Auto/manual alignment key LED will light.

3 Press either the X1 or X2 key to move the laser as follows:





Note:

1) When the instrument is in Auto Line Control mode, it is not possible to be in the Manual Line Control mode.
2) When the instrument is in Manual Line Control mode, it is not possible to be in the Auto Line Control mode.

Operating range error

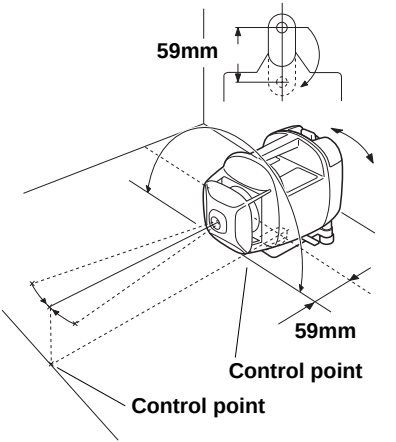
The range of line control is ±5 degrees.

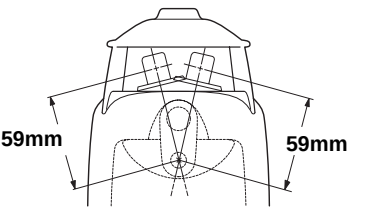
When the range has been exceeded, the red LEDs will flash alternately.

Press X1 or X2 key to cancel the error and set up the instrument again.

Setting 90° Vertical Layouts

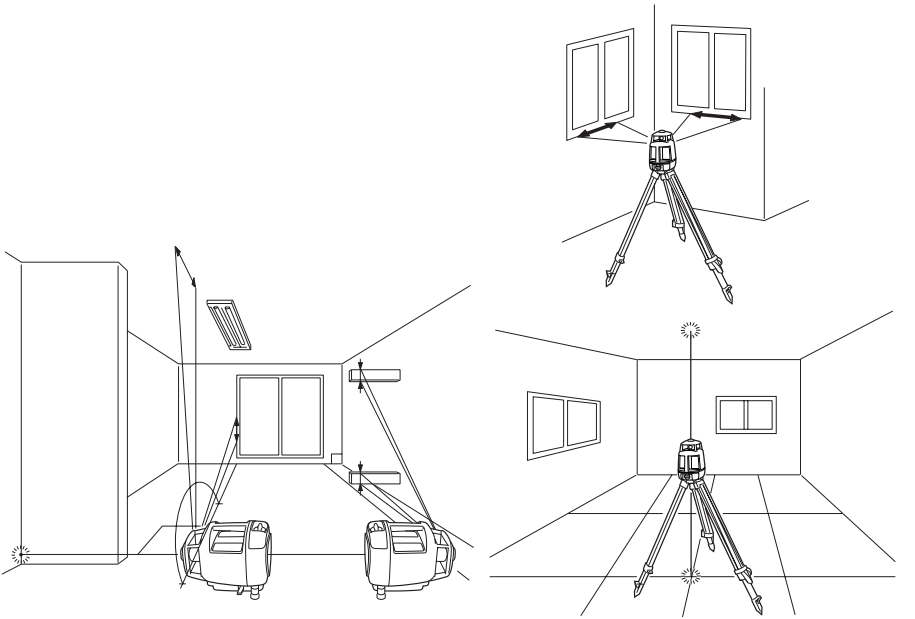
1. Move the front floor mount leg to its stored position.
2. Turn the rear floor mount leveling screws to bring the bubble to the center of the vertical level vial.
3. Press the Power Control key to turn unit on. When auto-leveling is complete, the beam will be emitted.
4. Align the beam on the control point.
5. Rotate the laser on the front floor mount, and place the upper plumb beam on the far control point. Fine adjustment can be done using the Manual Line Control mode.
6. Move the beam (in the stopping, scanning or changing speed modes) to the control point. The beam is 59 mm forward of the center of the front floor mount leg (in its stored position).





7 The rotating axis of the laser is directly over the center of the front floor mount leg in its stored position. Therefore the beam will rotate forward of the control point when the laser is rotated on the front floor mount leg.
The Off-set however is constant (59mm) from the rotation axis to the beam, so marking a control point 59mm behind the actual control point will make set-up easy and accurate.

Operational Example



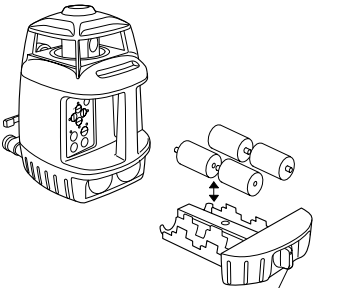
Maintaining Power Sources

How to replace dry batteries

1 Remove the battery cover by turning the battery compartment lock to “OPEN”.

2 Remove the old batteries and replace with four (4) new “D” cell alkaline batteries making sure each is placed in the proper direction as indicated.

3 Replace the battery cover (DB-49) and turn the knob to “Lock”.



Note	• Replace all 4 batteries with new ones. • Do not mix old batteries and new ones.

Rechargeable battery

Installing

1 Insert the BT-49Q into the DB-49C.

2 Place the DB-49C firmly into the instrument and turn the battery cover knob to “LOCK”.

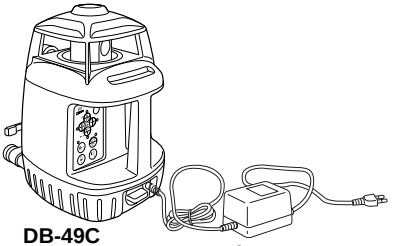
Charging

1 Plug the AC/DC converter (AD-9B or AD-7C) into the DB-49C battery holder.

2 Insert the converter receptacle in an outlet (AD-9B is for AC120V, AD-7C is for AC230V)

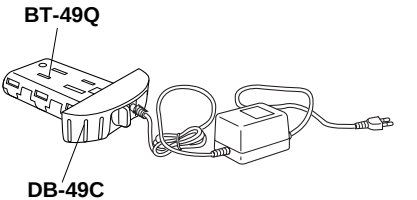
3 Complete charging by unplugging the converter connector from the DB-49C battery holder after approximately 9 hours.

4 Unplug the converter receptacle from the outlet.



The DB-49C LED will indicate charging status;

Red ON	:	Charging.
Green ON	:	Charging completed.
Green flashing	:	DB-49C is not connected to BT-49Q.
Red flashing	:	BT-49Q protection feature is working automatically. RL-VH3A/B/G can be used in this state.



Automatic protection feature; In case of overcharge or high or low temperature state exceeding charging range, charging will be stopped or changed to protect battery.

Note:

1) It can be charged while using the laser.
2) The BT-49Q rechargeable battery can be charged when removed from laser.
3) When the BT-49Q rechargeable battery is taken off from the DB-49 battery holder, the instrument can be used with dry batteries instead of BT-49Q.

Note:

1) Recharging should take place in a room with an ambient temperature range of 10°C to 40°C (50°F to 104°F).
2) The battery source will discharge when stored and should be checked before using with instrument .
3) Be sure to charge stored battery source every 3 or 4 months and store in a place at 30°C or below. If you allow the battery to be completely discharged, it will have an effect or future charging.
4) Recharging of the BT-49Q may sometimes be complete within 9 hours because of its remaining capacity.

Checking and Adjusting

There are three areas of performance the user should check periodically.

Horizontal Calibration

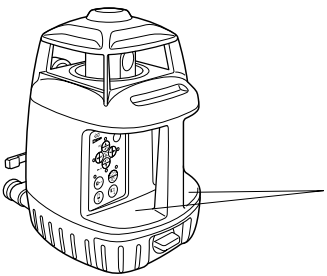
Horizontal Rotation Cone

Vertical Calibration

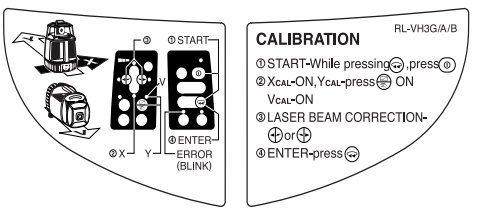
The Horizontal Calibration and Vertical Calibration can be easily checked and, in most cases, adjustments can be made by the user. Horizontal Rotation Cone can be checked by the user, if an error is found, adjustments must be made by a Topcon service facility.

Attaching the calibration decals

Before calibration, attach the calibration decals to the instrument as shown below. The calibration decal shows the calibration function of certain control pads on the control panel.

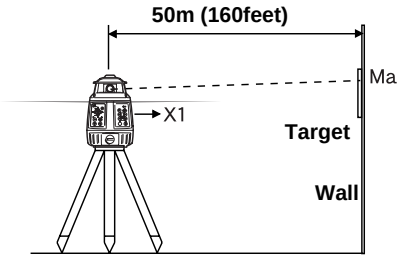


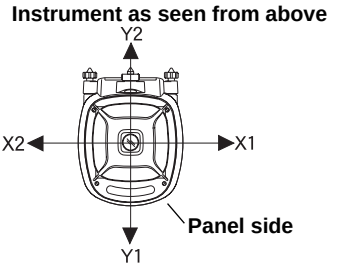
Calibration Decals



Horizontal Calibration

(1)Checking Calibration



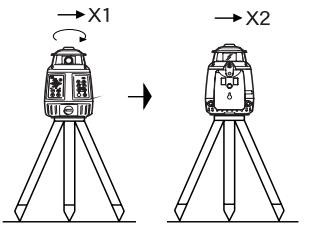


1 Set up a tripod 50m(160ft) from a wall. Mount the instrument on the tripod, facing the X1 toward the wall.

2 Turn the unit on and allow auto-leveling to complete.

3 Place a piece of paper on the wall. Detect a laser position on the wall with target and mark it. Turn the instrument off.

4 Loosen the tripod screw, rotate the instrument 180 degrees.



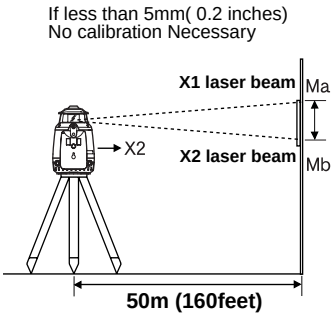
Note	• When rotating the instrument, avoid knocking it off level or changing height.

5 Turn the unit on again and allow auto-leveling to complete.

6 Make a new mark (Mb) where the laser beam strikes the paper.

7 Measure the distance between the first mark (Ma) and the second mark (Mb). No calibration is necessary if distance is within 5mm (0.2 inches).

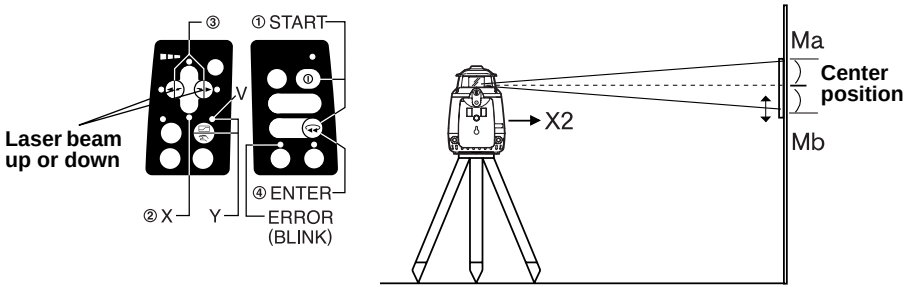
8 Repeat procedure for the Y axis.



(2) Adjusting Calibration

If the distance between either set of marks is more than 5mm (0.2inches), turn the unit off by pressing the [START] pad once and using the following procedure. Confirm that unit has shut off before beginning the procedure.
(In step 2 and 3, use of optional RC-30 remote control can be helpful. See page 64 .)

1 While pressing the [ENTER] key, press the [START] key. This activates the X axis calibration mode. Confirm that the [X] LED is lit.
Repeat Checking calibration steps 1 to 6 without turning the instrument off in the checking calibration step 3.



2 By pressing the right or left Alignment Control pad, move the X2 (Mb) laser beam up or down until its centered between marks Ma and Mb.

3 When the beam is precisely centered, press the [ENTER] key. The [X] LED will flash.

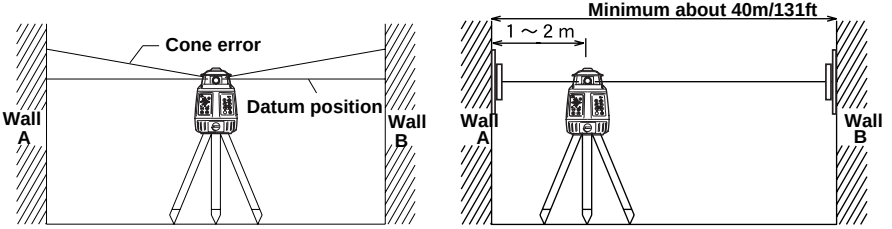
4 When the flashing stops, the X axis calibration adjustment is made and power is turned off automatically.

Note	• If the calibration is greater than the adjustment allows, the error LED will start flashing. If this occurs, contact your Topcon dealer.

For Y axis calibration, turn the unit as instructed in step 1 above then press the X/Y Axis Selection pad. Confirm that the [Y] LED is lit, then repeat steps 2 to 4 for the Y axis. Repeat the checking procedure to confirm proper calibration has been made.

Horizontal Rotation Cone Error

Perform the following check after completing "Horizontal Calibration" on the previous page.



1 Set up the laser centered between two walls approximately 40m (131ft) apart. Orient the instrument so one axis, either X or Y, is facing the walls.

2 Locate and mark the position of the rotating laser beam on both walls using the target.

3 Turn off the instrument and move the instrument closer to wall A (1m to 2m /3 ft to 6 ft). Do not change the axis orientation of the instrument. Turn the instrument on.

4 Again locate and mark the position of the rotating laser beam on both walls using the target.

5 Measure the distance between the first and second marks on each wall.

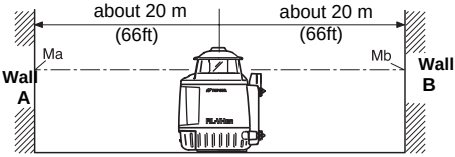
6 If the difference between each set of marks is less than 4mm (5/32 of an inch), no error exists.

Note	• If the error is greater than 4mm (5/32 of an inch), contact your Topcon dealer.

Vertical Calibration (Upward)

Perform the following check after completing "Horizontal Calibration" on the previous page.

(1) Checking RL-VH3G/A

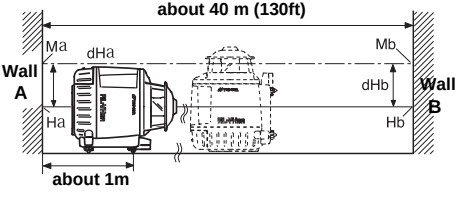


1 Set up the instrument half way between 2 walls a minimum of 40m away from each other. (The instrument can be facing either direction X or Y. And no tripod is used.)

2 Turn the power switch on.

3 Place a piece of paper on each wall (A and B).
Mark the horizontal laser positions (Ma and Mb) on each wall using target.

4 Turn the power switch off. Position the instrument for vertical operation (see instruction on page 19) with the bottom side directly facing wall A (see illustration). Make sure the unit is level by checking the circular level vial. Use the leveling screw to adjust if necessary.



5 Turn the power switch on. (Laser beam should be in scanning mode.)

6 Mark where the split beam is emitted from the bottom and top of the instrument strikes wall A and B. Measure the distance between two marks on each wall (dHa and dHb).

7 Compare the two measurements dHa and dHb. If the difference between the two measurements is less than 2.5mm (1/10 of an inch), no adjustment is necessary. Otherwise, adjust as follows.

(2)Checking RL-VH3B

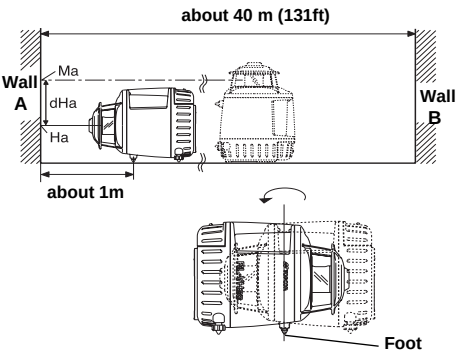
1 Set up the instrument half way between 2 walls a minimum of 40m away from each other. (The instrument can be facing either direction X or Y. And no tripod is used.)

2 Turn the power switch on.

3 Place a piece of paper on each wall (A and B).
Mark the horizontal laser positions (Ma and Mb) on each wall using target.

4 Turn the power switch off. Position the instrument for vertical operation (see instruction on page 19) with the rotary side directly facing wall A (see illustration). Make sure the unit is level by checking the circular level vial. Use the leveling screw to adjust if necessary.

5 Turn the power switch on. (Laser beam should be in scanning mode.)

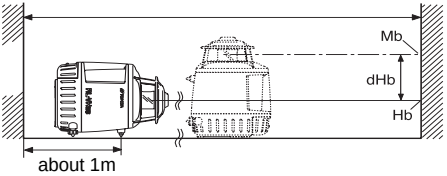


6 Mark where the split beam emitted from the top of the rotary head strikes wall A (Ha). Measure the distance (dHa) between marks Ma and Ha.

7 Without moving the position of the front foot, pivot the instrument so the rotary head is now facing wall B.

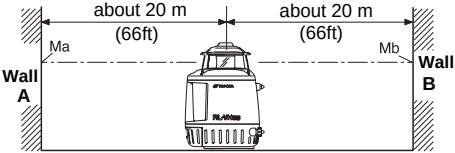
8 Mark where the split beam emitted from the top of the rotary head strikes wall B (Hb). Measure the distance (dHb) between marks Mb and Hb.

9 Compare the two measurements dHa and dHb. If the difference between the two measurements is less than 2.5mm (1/10of an inch), no adjustment is necessary. Otherwise, adjust as follows.



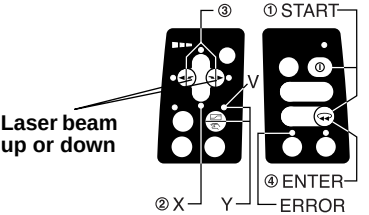
(3) Adjusting Calibration for RL-VH3A/B/G

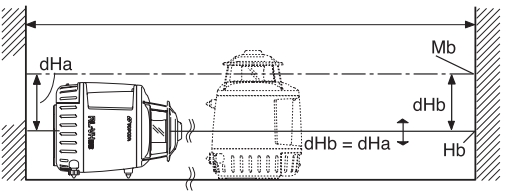
Turn the unit off by pressing the [START] pad once. Confirm that unit has shut off before beginning the following procedure. (In step 2 and 3, use of optional RC-30 remote control can be helpful. See page 66 .)



1 Without moving the unit, press the [ENTER] and [START] keys simultaneously.

2 Press either the right or left key on the Alignment Control pad to move the laser beam up or down on wall B until the measurement for the distance dHb is the same as the measurement dHa on wall A.





3 When the beam is positioned so the two measurements are the same, press the [ENTER] key. The [V] LED will flash.

Reference: for RL-VH3G/A Only

After step 3 in adjusting mode, the laser can be focused by pressing the manual focus pad.

4 When the flashing stops, the vertical calibration adjustment is made and power is turned off automatically.

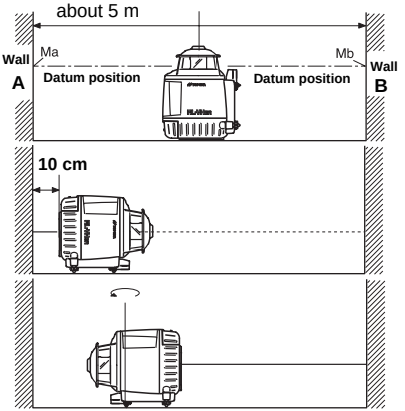
Note	• If the calibration is greater than the adjustment allows, the error LED will start flashing. If this occurs, contact your Topcon dealer.

Repeat the checking procedure to confirm proper calibration has been made.

Laser Beam (Downward)

Perform the following check after completing "Vertical Calibration (Upward)" on the previous page.

Checking



1 Place a piece of paper on each wall and measure the datum position in the same manner as " Vertical Calibration (Upward)" .

2 Set the laser on its floor mount, with the head facing wall B.
Turn the leveling screw to bring the bubble to the center of the vertical level vial.

3 Turn the power switch on.

4 Measure the distance from datum position on wall A.

5 Turn the power switch off. Rotate the instrument 180 degrees with the rotary head facing wall A. (do not move the front floor mount leg)
Turn the power switch on again and level the instrument.

6 Measure the distance from datum position on wall B.

7 When the difference between measurements is less than 2.5mm, the laser position is precise enough.

Note; If difference exceeds 2.5 mm, contact your dealer or Topcon.

Storage Precautions

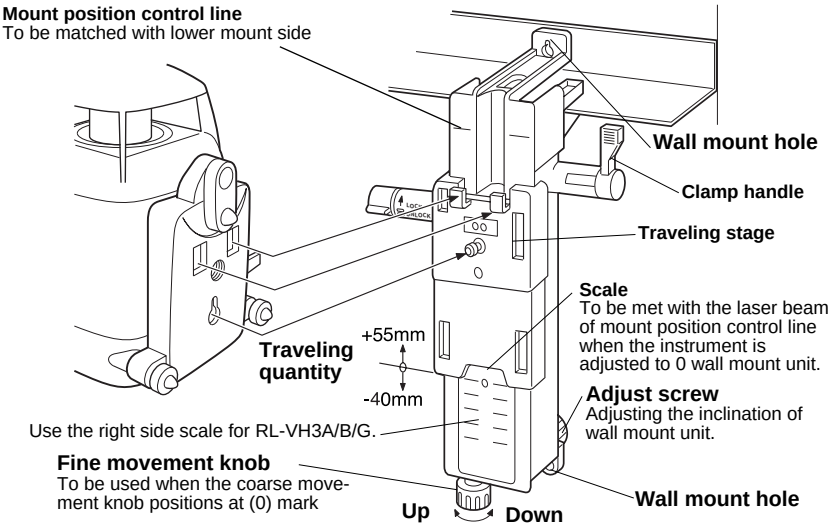
Always clean the instrument after use.
Use a clean cloth, moistened with a neutral detergent or water. Never use an abrasive cleaner, ether, thinner benzene, or other solvents.

Always make sure instrument is completely dry before storing. Dry any moisture with a soft, clean cloth.

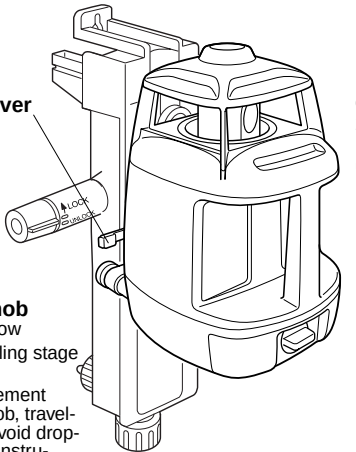
Standard / Optional Accessories

Wall mount-2C

This is used to attach the instrument to wall molding or metal studs. Grip wall angle/molding or screw to studs and tighten the attachment screw securely.


Mount position control line
To be matched with lower mount side
Wall mount hole
Clamp handle
Traveling stage
Scale
To be met with the laser beam of mount position control line when the instrument is adjusted to 0 wall mount unit.
Traveling quantity
+55mm
-40mm
Adjust screw
Adjusting the inclination of wall mount unit.
Use the right side scale for RL-VH3A/B/G.
Fine movement knob
To be used when the coarse movement knob positions at (0) mark
Up
Down
Wall mount hole

Note :Always tie a ceiling wire through the laser handle and secure to a fixed object as a safety precaution to prevent the laser from getting knocked or loosened from its position and to the floor.



How to mount /dismount the instrument

1)Set the floor mount hole on the traveling stage hook and slide the instrument downward.

2)To dismount, press the mount/dismount lever while sliding the laser upward.

Coarse movement knob

Indicating the knob as follow

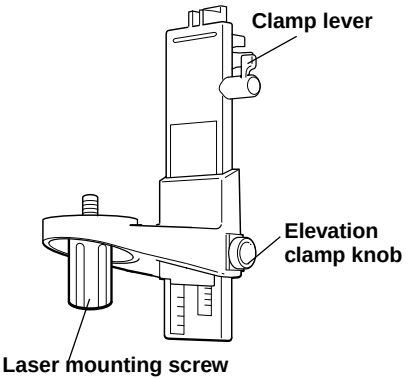
↑ LOCK: Fixing the traveling stage

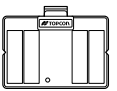
○ Fine movement

○ UNLOCK:Coarse movement

(When you unlock this knob, traveling stage will be free. To avoid dropping the instrument, hold instrument by its handle.)

Wall mount model-1C (For RL-VH3B)

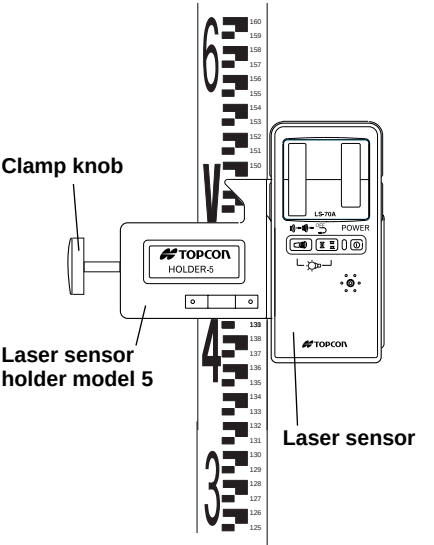




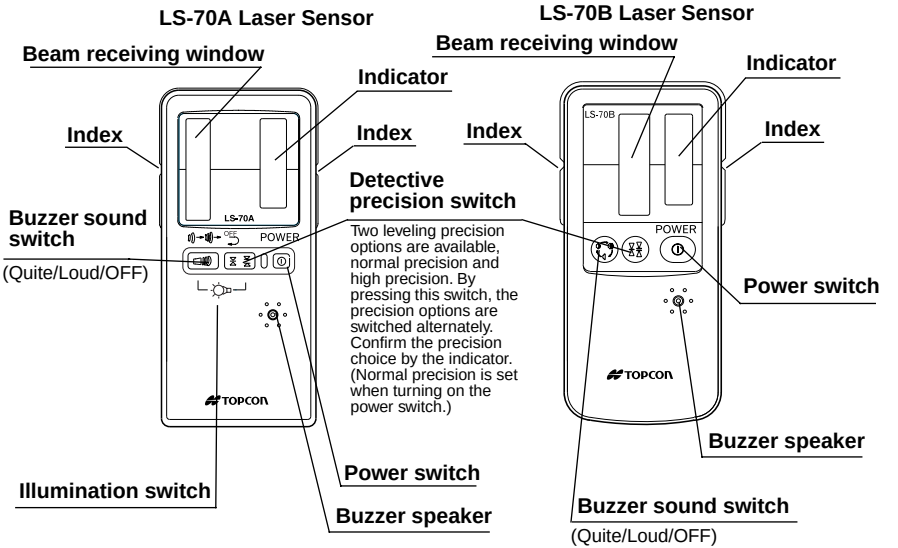
Clip on target

Used for gripping girder or ceiling

Laser sensor holder model 5



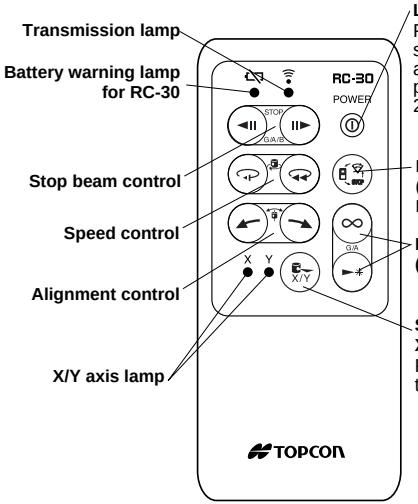
Holder Model 5 allows the laser sensor to be moved up or down on the staff by squeezing the spring-loaded clamp on its back side without removing the sensor from the staff.



Auto-cut off function (LS-70A and LS-70B)

The power will be turned off automatically if no laser beam is detected within approximately 30 minutes. (To turn the sensor on again, press the power switch.)

RC-30 Remote control



Laser Power Switch (Standby mode)
Pressing this switch for more than three seconds puts laser in standby mode, allowing the user to conserve battery power. If laser remains in standby mode for 2 hours, laser will turn off automatically.

Mode switch control (RL-VH3G does not have Laser sensor mode.)

Manual focus control (Only for RL-VH3A/G)

Slope mode / X/Y axis selection
Press this key for more than three seconds to set slope mode or select X or Y axis.

Description of RC-30 functions

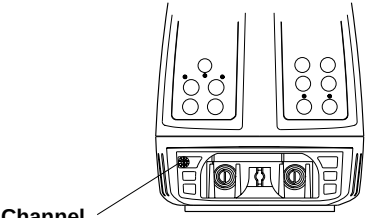
Laser power switch (Standby mode)	Pressing for more than three seconds turns laser standby mode on or off. Laser turns off if standby mode continues for two hours.
Transmission lamp	This lamp will indicates a signal is being transmitted by the RC-30. It should illuminate any time a control pad is pressed.
Battery warning lamp for RC-30	Battery warning for RC-30. Replace the batteries with new ones.
Stop beam control	Sets Stop Beam mode and moves laser.
Speed control	The rotation speed of the rotary head can be changed.
Alignment control	Moves beam up or down (horizontal rotation). Moves beam right or left (vertical rotation).
X/Y axis lamp	Indicates axis selected during beam sloping operation.
Laser Power switch (Standby mode)	Turns laser standby mode on or off by pressing this key for more than three seconds. (The laser will be turned off automatically if the standby mode is continued for 2 hours)
Mode switch control	Laser mode is switched alternately as follows. Scan mode / Laser sensor mode / Laser pointing mode.
Manual focus control	Laser beam can be focused manually. (RL-VH3G/A models only)
X/Y axis selection	Sets slope mode by pressing for more than three seconds. Select X or Y axis for manual grading. To cancel the slope mode press this key for more than three seconds.

How to set remote control communication channel

The same channel must be set on the RL-VH3G/A/B and the RC-30 remote controller.

RL-VH3C

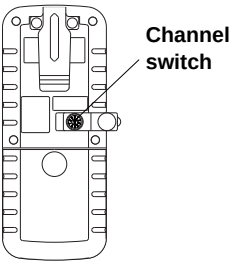
1. Remove the battery cover by turning the battery compartment lock to “OPEN”.
2. Turn the channel switch to set a channel by using with a small straight screw-driver.
3. Replace the battery cover and turn the knob to “Lock”.



RL-VH3G/A/B

RC-30

1. Remove the rubber cover from the channel switch on the back of the RC-30.
2. Turn the channel switch to the same channel position set on the RL-VH3G/A/B.
3. Replace the rubber cover.



RC-30

Specifications

Accuracy

Upright instrument	Horizontal rotation	±10"
	Vertical laser beam (Upward)	±15"
	Vertical laser beam (Downward)	±0.5mm/1m
Laydown instrument	Vertical rotation	±15"
	Horizontal laser beam (Forward)	±10"
	Horizontal laser beam (Backward)	±0.5mm/1m

Auto-leveling range **:** ±5°

Measuring range

Range of visible laser beam * Note1)

Horizontal, Vertical (When scanning)	Radius approx. 50m (164ft)
Laser beam spot (Upward)	Radius approx. 50m (164ft)
Laser beam spot (Downward)	Radius approx. 5m (16.4ft)
Note1)The distance of visible laser beams are not constant due to the brightness of the surroundings.	

Using with LS-70A/70B : Diameter 2 to 500 m (6.6 to 1640.5ft)
(RL-VH3A/B Only)

Light source **:** L.D (Visible laser)

Wave length **:** 633nm (RL-VH3A/B)

: 532nm (RL-VH3G)

Rotation speeds

RL-VH3A/B	**:**	Changeable : 30 to 600 r.p.m. Level sensor mode : 600 r.p.m When scanning : 80 r.p.m
RL-VH3G	**:**	Changeable : 30 to 300 r.p.m. When scanning : 80 r.p.m
Scanning width	**:**	Maximum 180°

Line control

Operation distance	**:**	3 to 50 m (9.8 to 164ft)
Head angle range	**:**	±5°
Accuracy (from side to side in the index center)		
	:	3 to 5m : ±1mm
	:	5 to 50m : ±1mm + 10" (3mm/50m)

Slope setting

Operation distance	**:**	3 to 50 m (9.8 to 164ft)
Accuracy	**:**	3 to 5m : ±1.5mm
	:	5 to 50m : ±1.5mm+10" , (3.5mm/50m)
Range	**:**	Single axis : ±5° Dual Axes : ±5° (Compound slope)

Plumb finder mode

Accuracy	**:**	±15’
Power supply	**:**	4 D-cell batteries (DC6 V), Rechargeable battery BT-49Q

Continuous operating time (+20°C)

Alkaline manganese dry batteries

RL-VH3A/B	**:**	Approx. 40 hours
RL-VH3G	**:**	Approx. 30 hours

Rechargeable battery BT-49Q

RL-VH3A/B	**:**	Approx. 30 hours
RL-VH3G	**:**	Approx. 20 hours

Tripod screw	**:**	Flat and dome head type, 5”/8 × 11threads
Operating temperature	**:**	-20°C to +50°C (-4°F to +122°F)

Dimensions

RL-VH3A/G	**:**	214(L) × 167(W) × 259.5(H) mm [8.4 (L) × 6.6(W) × 10.2(H) in]
RL-VH3B	**:**	193.5 (L) × 167(W) × 259.5(H) mm [7.6(L) × 6.6 (W) × 10.2(H) in]

Weight (with Holder DB-49C)

RL-VH3G	**:**	3.0 kg [6.6 lbs] (without batteries)
RL-VH3A	**:**	2.5 kg [5.5 lbs] (without batteries)
RL-VH3B	**:**	2.3 kg [5.1 lbs] (without batteries)

Width and diameter of visible beam

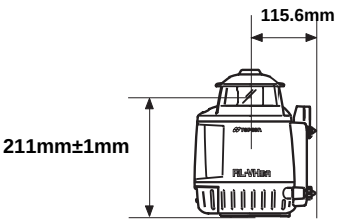
			Distance	1m (3.3ft)	5m (16.4ft)	10m (32.8ft)	30m (98.4ft)	50m (164ft)
Width of visible beam *Note	Horizontal, Vertical (When scanning)			0.5mm	1.0mm	1.5mm	3.5mm	5.0mm
Diameter of visible beam *Note	Diameter of laser beam spot (Upward)	RL-VH3G		0.5mm	1.0mm	2.0mm	5.0mm	8.5mm
		RL-VH3A/B		0.5mm	1.0mm	2.0mm	6.0mm	10.5mm
	Diameter of laser beam spot (Downward)			1.5mm	8.0mm	———	———	———

Note The distance of visible laser beams are not constant due to the brightness of the surroundings.
The above data except Downward beam spot is the values when the laser beam is focused.

Datum laser position

Upright : 211mm±1mm

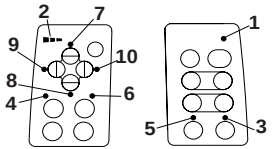
Laydown : 115.6mm



RC-30 Remote control Using with RL-VH3G/A/B

Operating distance : Max. 90m (295ft)
(Operating distance will vary depending on environmental conditions.)

Error Indication



B: Blink
A: Alternate blink
Number: Blinks in order

LEDs	1	2	3	4	5	6	7	8	9	10	Countermeasures
Tilt system error	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	Turn OFF and ON again.
Vertical beam alignment range err.									A		Setup the instrument and try to align the beam again.
Slope setting range err. (X or Y axis)							**A Y err.**		**A X err.**		Setup the instrument again and try to set slope again.
Auto-leveling range over	**1**	**3**			**2**						Setup the instrument again.
Height alert	**B**	**B**			**B**						Turn OFF and ON again.
Internal memory err.						**B**					Turn OFF and ON again.
Mechanical err.	**Laser beam blinks.**										Turn OFF and ON again.
If errors still persist after attempting to clear them, contact your dealer or Topcon.											

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